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RETROPHARYNGEAL ABSCESS IN AN INFANT, FOLLOWED BY PARALYSIS OF THE OCULAR BRANCHES OF THE SYMPATHETIC NERVE OF ONE SIDE.

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Annie A., nine months old, was brought to me by her mother September 16, 1893, on account of a peculiar condition of her right eye. Whilst the left eye appeared normal in every respect, the palpebral fissure of the right eye showed only half the width of that of the other. The pupil of the right eye was also smaller, its diameter being about one half of that of the other eye. The outlines of the miotic pupil were regular, the vertical diameter being a trifle larger than the horizontal.

These were the only abnormalities that could be made out. Both pupils responded to the action of light. There was no impairment in the mobility of either globe. The right upper lid, though permanently lower than the left, was raised when the child looked upwards. There was no sinking back or enophthalmus of the affected eye. The mother stated that she had covered the well eye and convinced herself that the baby

could see with the right eye. No satisfactory ophthalmoscopic examination could be made on account of the restlessness of the baby who, in every other respect, seemed quite well.

Three months ago when the child was six months old, it was attacked by a retropharyngeal abscess which had to be repeatedly incised from the mouth. The physician who had the child in charge had a suspicion that the abscess was due to disease of the cervical vertebræ. The little patient was very low at that time and was not expected to live. Its rapid recovery was looked upon as almost marvelous. This quick recovery speaks against the presumption that there was disease of the bone at the bottom of the abscess.

No definite statement can be had of the mother who belongs to the least intelligent classes of the community as to the exact time when the eye symptoms made their appearance, but it seems highly probable that the incisions made had nothing to do with the production of these symptoms, and that the latter were the consequence of the morbid process itself.

There is no difference in the color of the two sides of the face or of the ears, nor is there in the temperature of these parts as far as can be made out by palpation. There is no swelling of the submaxillary or cervical glands to be felt at present.

The child was seen only once as the mother failed to return.

As far as I know the literature of the subject, this is the first case on record where paralytic symptoms of the ocular branches of the sympathetic nerve were noticed after recovery from a retropharyngeal abscess. The two symptoms observed here, the ptosis and the miosis, were evidently due to paralysis of the *palpebralis* and *dilatator pupillæ* muscles, both innervated by branches originating from the cervical sympathetic nerve.

Those who are interested in the subject of the relation between the cervical sympathetic nerve and the eye will do well to look up the exhaustive papers of Möbius (*Zur Pathologie des Halssympathikus. Berliner Klin. Wochenschr.*, 1884), and Theodor Beer (*Studien ueber den traumatischen Enophthalmus*).

Knapp and Schweiger's *Archiv. f. Augenheilk.*, xxv, Bd. 1892, German Edition). Both of these papers contain ample references to the literature of the subject.

The case will in all probability make the rounds of the special dispensaries of this city. My object in publishing the incomplete notes I have taken is to draw special attention to it. It will be interesting in many respects to observe further developments. In a large number of similar cases abnormalities of the sensibility of the skin of the affected side have been observed. It will, of course, be very difficult to test for anything of this kind in so young a child. Other objects to be kept sight of are the blood supply, color, and state of nutrition of the right side of the face and neck as compared with the other, also the function of the sweat glands, and the pulse-rate.

As observed before, there was no sinking back of the globe or enophthalmus when I saw the patient. As Moebius pointed out, this symptom of paralysis of the cervical sympathetic nerve is apt to develop only later in the course of time. The reason for this tardiness is not given by Moebius. I venture to give the following explanation for it.

In the case here reported there was ptosis on the right side. This ptosis was not caused by paralysis of the respective branch of the oculomotor nerve which supplies the *levator palpebræ superioris* muscle, but by paralysis of the unstriped *palpebralis* muscle which has been discovered by Heinrich Müller, and which is innervated by the sympathetic nerve. The same twig which supplies this muscle also innervates the *orbitalis* muscle. Irritation of the latter causes protrusion, and paralysis the opposite condition which is called enophthalmus. The position of the globe within the orbit depends upon the sympathetic nerve in two different ways. First, because the function of the *orbitalis* muscle is regulated by this nerve in the way we have just detailed. Second, the position of the eyeball depends, also, upon the amount of blood contained in the vessels of the orbital cavity, and this amount of course upon the calibre of these vessels, which calibre again depends upon the state of innervation of the muscular fibres in their coats.

These fibres are innervated by a branch of the sympathetic nerve. Paralysis of this branch will cause an increased amount of blood to be contained in the post-ocular vessels and consequently a protrusion of the globe. Paralysis of the branch innervating the *orbitalis* muscle has the opposite effect, as we said just before. In the case of the child under discussion we may safely assume that both these branches are paralyzed and that effects of this paralysis neutralize each other for the time being. Paralysis of branches of the sympathetic nerve also causes nutritive changes. These, of course, cannot show themselves immediately, but take time to develop. Whenever they will have had time to develop in our patient, enophthalmus will be observed as a result of atrophy of the orbital tissue combined with paralysis of the *orbitalis* muscle. (Compare: E. Heese, Ueber den Einfluss des Sympathicus auf das Auge, etc. *Pflueger's Archiv f. Physiol.*, Bd. LII.).

The tension and the size of the eyeball are further points of which notes should be taken. Nicati (*La paralysie du nerf sympathique*. Lausanne, 1873. Quoted by Moebius), and Moebius observed that in the course of time the size of the globe shrank in cases of paralysis of cervical sympathetic nerve.

Postscript.—At the time I was engaged reading the proof of the foregoing, I met mother and child again. The mother reported that the child when warm and perspiring, did not show any perspiration in the left side of her face which also felt cool at such times as compared with the other side. The skin of the lids of the right eye is slightly reddened. This, the mother says, is caused by the baby rubbing this eye very frequently on account of the presence of an increased amount of secretion oozing from between the lids.

ON CROUPOUS OR HÆMORRHAGIC IRITIS.¹

BY ADOLF ALT, M.D., ST. LOUIS.

Iritis is a disease of such importance that every text-book on ophthalmology must needs devote considerable space to its description and in most text-books there is quite an important and lengthy chapter which goes minutely into details of the clinical and pathological features of so frequent and important an affection. It is, in consequence, doubly strange, that one form of iritis which constitutes a well marked type, is to this day in most text-books not mentioned at all and receives in but a few a very scanty notice. I mean, what has formerly been called *iritis gelatinosa*, or *spongiosa* (spongy iritis [Knapp]), what years ago after a histological examination I termed *hæmorrhagic iritis* and what, I now think should be called "*croupous iritis*."

The literature concerning this form of iritis began with the description of two cases by Schmidt (*Klin. Mtsblatter f. Augenheilkunde*) in 1871. This was followed by papers by Gunning (*Klin. Mtsbl.*) in 1872, a case by Gruening and one by Kipp (*Knapp's Archives*, Vol. III) in 1873, five cases by Knapp (*his Archives*, Vol. VI), one case by myself with histological examination (*Knapp's Archives*, Vol. VI), two cases of iridocho-roiditis of the same nature by Knapp (*Archives*, Vol. VII), and one case by Swan M. Burnett in 1880 (*American Journal of Medical Sciences*). This, with the exception of a casual remark here and there, is all that I can find in the literature at my disposal concerning the disease under consideration.

The number of cases here mentioned in literature does, of

¹Prepared for the Pan-American Medical Congress at Washington.

course, in no way compare to the number of cases observed—and the disease is not as rare as one might suspect from the fact that its existence is almost totally ignored in the textbooks. I myself have notes of some thirty cases and Knapp stated in Volume VI of his *Archives* that he had notes of about eighteen cases, which number has surely been considerably increased since then.

Pathological distinction between the different forms of iritis is usually made according to the product of the inflammation and we have three types generally adopted and described, namely, the serous, the plastic and the purulent iritis. We all know that these forms often are mingled with each other, still typical cases of each kind are seen often enough to enable us to clearly distinguish them.

To these well recognized types must be added as the fourth type, that of croupous iritis, the characteristic exudation being in no way distinguishable from the croupous exudation elsewhere. Clinically this exudation is first seen as a grayish, grayish-yellow or grayish-green semi-transparent substance (showing sometimes stripes and dots), which, when the patient is seen, usually fills the anterior chamber to its full extent. After having remained apparently much the same for a period varying from a day to a week and even much more, during which time hæmorrhages into the anterior chamber not infrequently take place, the exudation becomes transparent in its periphery, is liquified and gradually absorbed. This change is visible usually at first in the upper part of the anterior chamber where a small strip of iris tissue becomes uncovered the exudation sinking according to the law of gravitation. The exudation then shows a sharp, sometimes perfectly round, sometimes jagged edge upward, and has at this stage an appearance which very much resembles a cataractous crystalline lens dislocated into the anterior chamber. This likeness is the more striking as the anterior chamber usually is very deep. Gradually the melting process and the absorption of the material go on. Later a small piece only is seen lying at the bottom of the anterior chamber and finally this, too, disappears.

When the exudation has perfectly gone, the eye is generally in the same condition as one recovering from a plastic iritis.

Such a croupous iritis may be seen to run its course totally uncomplicated, and to heal without or with the formation of synechiæ, or it may be seen to develop as a separate feature during a plastic or gummatous iritis, or it may be accompanied from the outset by a purulent iritis. It may come on spontaneously or, what is more frequent, after an injury or operation.

That the disease in its typical form may spread also to the ciliary body and choroid seems proven by the cases clinically observed by Knapp. That it may also constitute part of a deleterious iridochoroiditis, which clinically is usually recognized as a purulent one only, I have shown in a recent paper, published in the AMERICAN JOURNAL OF OPHTHALMOLOGY. (See Vol. X, No. 5, page 136).

Let me here introduce the short histories of a few typical cases.

B. F. S., came to consult me on account of an injury due to a piece of steel striking his right eye. Another physician had worked for two hours on the previous evening to remove the piece and finally declared that he had succeeded. The patient having passed a night of excruciating pain, came to see me the next morning. There was a great deal of swelling, photophobia and lachrymation. After cocainization I found considerable circum-corneal injection, the anterior chamber filled with a grayish exudation, by which a small chip of steel was prevented from falling into the depth of the anterior chamber which had evidently been pressed through the cornea during the attempt at removal. By passing a knife through the cornea behind the piece of steel and a fine point of the electro-magnet through the channel of passage of this foreign body through the cornea, I succeeded in removing it with little trouble. The next day the exudation where my knife had passed it, began to melt away, also at the height of the anterior chamber. Five days later every trace of it had disappeared and although some small pigment spots could be seen on the anterior lens capsule no synechiæ remained behind and

the pupil was round and wide. The pain had ceased two days after the removal of the piece of steel.

In this case we have to deal with an uncomplicated croupous iritis due to an injury.

R. F., called on me with a spicule of steel, which had struck his left eye, sticking in the anterior lens capsule. This foreign body had been in the eye for three days and had caused a violent and excruciatingly painful inflammation. There was hypopyon and the remainder of the anterior chamber was filled with a croupous exudation, so that the very thin piece of steel could but barely be located in the center of the anterior lens capsule. Although I thought the eye lost, I attempted to remove the foreign body with Gruening's magnet, but it would not adhere. I only succeeded in disengaging it from the lens capsule. I then washed the anterior chamber clean by means of a syringe with a solution of bichloride of mercury, 1 in 5000, thus dislodging the croupous exudation, the foreign body enclosed within it, and the pus. The following night the patient was free from all pain and made a good recovery, no further croupous exudation nor pus formation took place. The cataract caused by the injury to the lens-capsule, was successfully removed later on.

Here we have a purulent traumatic iritis combined with a croupous iritis.

The following case was probably the severest case of croupous iritis I ever observed. It has also the further point of interest, that it was probably combined with a gummatous iritis, although this is not absolutely certain.

J. R., called on me on account of a dimness of vision in the left eye which he had noticed for a few days. He had been operated upon his left hand two weeks previously on account of what was pronounced a cancer, and which necessitated the removal of the little finger and metacarpal bones.

The pupil, when he first called on me, was small and there was little circum-corneal injection. Under the influence of atropine instillations a moderately broad synechia became visible which was situated up and outward. This synechia was

firm and in the following few days the iris-tissue at this very point assumed a yellowish appearance and swelled up, as we see this when a so-called gumma of the iris makes its appearance. At the same time a papular eruption showed itself in the patient's face and on his forehead. I now took the case to be surely one of syphilis and, with the consent of the surgeon who had operated upon his hand, gave him mercury internally. On Wednesday I showed him to the intermediate class at the Beaumont Hospital Medical College as a case of gummatous iritis. During the following night he had some attacks of severe pain, and the next day I could demonstrate the same eye to the senior class as one suffering from croupous iritis. At that time the croupous exudation did not half fill the anterior chamber, but it filled the whole anterior chamber the next day. The exudation, in this case, remained almost unaltered for nine days. During this time the inflammatory symptoms were considerably aggravated and several small hæmorrhages took place into the anterior chamber, followed by a large one on the seventh day during which blood in a considerable quantity was forced between the lamellæ in the lower part of the corneal tissue, as we see pus lying between the corneal lamellæ in abscess of the cornea. Finally on the tenth day the first signs of the melting of the exudation could be seen upwards and inwards and in six more days everything abnormal had disappeared from the anterior chamber. The synechia had almost become a circular one, but he declared vision as good as ever ($\frac{20}{1}$). The blood between the corneal lamellæ was gradually absorbed and when I saw him three months later a rust-brown spot in the lower part of the cornea marked the site of the former hæmorrhage.

In all of these cases we had to deal with croupous *iritis* alone. A milder type of croupous iridochoroiditis in both eyes, as stated, was clinically observed by Knapp. That the disease really does attack the choroid and ciliary body, I think the microscopical examination of the case published in the May number of the AMERICAN JOURNAL OF OPHTHALMOLOGY has proven.

The cases of croupous iritis reported in literature as well as these which I have added to them in the foregoing, give a certain clinical picture which is distinct from (although often mixed with) the types of iritis which no text-book disregards.

We have an inflammatory disease of the iris which is usually ushered in by severe pain, œdema of lids and conjunctiva, and circum-corneal injection, and which leads to the formation of a peculiar exudation into the anterior chamber. This exudation is formed rapidly and when noticed usually fills most or all of this space. It is a grayish-yellow semi-transparent substance often showing a coarser net-work of fibres. When it fills the anterior chamber completely, it can be recognized in its true character only by the fact that the corneal epithelium and parenchyma are transparent. During the period of its development and later on hæmorrhages into the anterior chamber are not infrequently seen.

After having apparently remained unchanged for a varying number of days, the exudation begins to clear up and melt from the periphery and the solid mass assumes in consequence a more or less lens-like shape, and sinking to the bottom of the anterior chamber leaves at first the upper part of the iris uncovered. It then presents a sharp and well-defined edge. This process of clearing and melting away is sometimes quite rapid but may take two weeks and more. I have seen one case in which it took twenty-five days. When the contents of the anterior chamber appear perfectly cleared up again, usually one or more posterior synechiæ are found, but the eye quickly recovers otherwise. In the uncomplicated cases not even a synechia may remain behind.

The true character of the exudation I have had occasion to study histologically a number of times. It consists invariably in the main of a minute network of finest fibres of coagulated fibrine containing few round-cells and in no way different from the exudation as seen in other croupous affections, as for instance in the tissue of the lungs in croupous pneumonia. I, therefore, think it is best to designate this form of iritis as croupous iritis. I thought that Dr. S. M. Burnett had so desig-

nated it, but, from his paper, I find that I was mistaken. With regard to the origin of this peculiar exudation I had formerly thought, that the hæmorrhages found clinically in the anterior chamber and histologically also in the iris-tissue might be the characteristic feature. This was probably wrong. In a number of cases in which I have of late been able to examine the voided exudation bacteriologically, as far as in my power, I have several times found clusters of cocci arranged in the manner of the staphylococcus pyogenes aureus. It seems, therefore highly probable that in this disease we have to deal with a special form of infection which is worthy of further study.

The rapid healing and immediate ceasing of all pain and of the inflammation after washing the anterior chamber with a solution of bichloride of mercury in one of the cases related is, perhaps, to be taken as a further proof of the correctness of this view, and might be made useful in the treatment of this form of iritis when it appears severe and does not yield readily. Otherwise, the treatment employed in cases of plastic iritis seems to answer the purpose fully.

SELECTIONS.

THE PATHOLOGY AND TREATMENT OF GRAVES' DISEASE.¹

BY W. H. THOMSON, M.D.,

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The progress of pathology often illustrates the disadvantage of the premature naming of diseases after some of their common or prominent symptoms, for further knowledge may show the disease to have much wider relationships than at first suspected, and in some cases to exist without these symptoms being present. If such be the case, the symptomatic name may then operate to prevent a correct diagnosis. Locomotor ataxia is a good example of the concealing power of such names, for I have known of an elaborate diagnosis being made of a tumor in the optic thalamus to account for the optic atrophy of a tabetic patient who, though wholly blind, yet had no ataxic gait, while in other patients with this disease the significance of pains or of gastric crises has been similarly misinterpreted, because the motor symptoms were so little developed. In like manner the name exophthalmic goitre has had much the same influence in preventing the recognition of Graves' disease in many instances, and still more in confusing the views of its pathology. In reading the numerous contributions on the pathology of this interesting affection, it is striking to note how predominantly the conception of some text-

¹Read before the New York Neurological Society, March 17, 1893.

ural lesion in the nervous system that would account for the exophthalmia and the goitre has directed either the investigation or the speculation, in seeming forgetfulness of the fact that these symptoms are not essential to the affection, because they may be both present with Graves' disease absent, or both absent with Graves' disease present.

The safest rule to follow in pathological problems is to seek first for the most constant characteristics of a given complaint, rather than for the most obtrusive ones, for, when the latter are found to be wanting in some real cases of a given affection, they sink at once from the rank of a primary to that of an accessory relationship to its true pathology. Having found the most constant characteristic of the disease, we must even then keep to what is most constant about the characteristic itself when we come to analyze it, lest we be again turned aside from the right course by non-essential accompaniments. Thus the most uniform condition in Graves' disease is what may be correctly described as a state of marked agitation. In many instances it is for long a purely physical state, not involving the mind or the spirits, and yet the patient acts as if greatly alarmed about something. This has led many writers to pronounce fright to be a leading cause of the disease, and how far this hypothesis may be pushed is illustrated by Dr. Hector W. Mackenzie, in his excellent lectures on Graves' disease (*Lancet* September 1890), when he sums up its pathology by saying that if we can not show in each case that the patients themselves have so started from a fright, yet some of their ancestors may once on a time have been greatly terrified, and thus laid the foundation for Graves' disease in a descendant by what he terms an unconscious hereditary memory. We are thus at the outset diverted from the study of a truly characteristic condition to that of a most occasional element in the clinical history of the affection, and which is then made to do duty as a guide to its true pathology. The parallel instance of chorea, where fright is so often spoken of as a cause of the disease, naturally suggests the desirability of a new technical meaning of the term "cause" in medicine. It would be a great gain to restrict

its use only to some element, discovered or to be discovered, in the ætiology of a disease without whose presence the disease would not exist, while for all variable factors to employ some such term as occasion. Thus fright may be the occasion of the first manifestation of chorea or of Graves' disease, a blow the occasion of the development of a mammary cancer, a chill from exposure to cold the occasion for the development of a croupous pneumonia or of a pulmonary phthisis, but it is only a hindrance to our progress toward a correct pathology of either of these diseases to put down any one of the very varying occasions of its first manifestation as its cause. It would be better to defer rating anything that is occasional in a disease until its proper and quite subordinate place is settled by the due precedence being determined of the few constant over the many occasional elements. This is particularly the case with such a convenient cause to allege as fright in nervous patients, for not infrequently it may prove on examination that the patients had been for months in a state of true physical agitation before the accident of a mental impression occurred which they describe. In my last eight consecutive cases of Graves' disease in private practice not one of them would ascribe the initiation of the complaint either to fright or to any other emotional cause. Of course it is impossible to say what may have happened to their ancestors, but I think that a much nearer source of their bodily agitation may be found in their present living frames than in the dead past.

The first of the above-mentioned patients presented at her first visit a complete picture of the constant, in distinction from the occasional, symptoms of Graves' disease. „I had known her well for some time, from having attended other members of her family, but she had always been healthy before, so that I had not seen her for some months. She showed no sign of either exophthalmia or goitre, but, as she now began her story, she seemed as if about hesitatingly to divulge some great cause of mental distress. Her voice trembled as if choked with emotion, her hands trembled, and her respiration was hurried and catching. She said, however, that she had had nothing

to make her so nervous, nor could she imagine why she was so, except that she had had diarrhoea all summer, but that other people had diarrhoea without being as nervous as she was. As soon as I examined her pulse, which was over 140, with a normal temperature, and noted that the muscular tremor was so extensive, I felt assured that she had Graves' disease, though it was not till long afterward that she showed any enlargement of the thyroid, and never up to her death from this disease, three years afterward, did she show any exophthalmia.

The second and third patients were sisters, the second a young unmarried woman with very rapid action of the heart and considerable enlargement of the thyroid, but no exophthalmia. She entirely recovered. Her sister was married and some fifteen years older. She had no marked goitre and but a very slight exophthalmia, but she had rapid heart action, with very extensive throbbing of the arteries, and complained of frequent abdominal pains. She quite recovered for four years and then had a relapse, from which she has again improved. Both these patients had suffered from rheumatism, and the elder had a permanent hip lameness from it. They were both poor and hard-worked, but otherwise had no cause of mental depression or shock.

The fourth patient found her nervousness a mystery to her. She had naturally a lively disposition and she had contracted a fortunate marriage, so that she felt contented with everything in her life, when without apparent reason she became unaccountably nervous. She developed goitre and exophthalmia very rapidly, and with von Graefe's symptom very distinct, and she became both anemic and emaciated. The heart's action was violent and accompanied by loud systolic murmurs at the base and apex. After a year of most serious symptoms she gradually improved and is now in a fair state of health, with but moderate exophthalmia or goitre.

The fifth patient, a very accomplished lady and a happy wife and mother, came complaining that she lacked the repose of strength. She is a prominent advocate of the rights of

women, and hence felt humiliated at finding herself turning into a weak, trembling, nervous creature. She had enlargement of the right side of the thyroid, but no exophthalmia on either side. She had suffered from both rheumatism and chorea in childhood, and has now two children—daughters—who are beginning with choreic symptoms. Under treatment she wholly recovered.

The sixth case was peculiar in that the symptoms first developed when the patient was about sixty-five years of age. She had thyroid enlargement and was subject to suffocative nocturnal attacks like laryngeal crises. She had rather persistent albuminuria for six months, and during the course of Graves' disease she was extremely nervous and much troubled with insomnia. She wholly recovered for four years from all her symptoms, finally dying from pneumonia during the epidemic of influenza of April, 1891, at the age of seventy-four. She had a marked family history of rheumatism.

This lady, however, had a daughter, now about thirty-five years of age, who, after some years of delicate health, began to show a uniform enlargement of the uterus, which in about two years continued to increase until it reached the umbilicus. My friend Dr. Robert Watts examined her with me and pronounced it a myxomatous hypertrophy of the uterus, similar to a case which we both had together in the Roosevelt Hospital some years before, and in which afterward the late Dr. Peaslee performed hysterectomy at the Woman's Hospital. The interest of the present case is that, without any other symptom of myxœdema, she has gradually become very enfeebled in mind, and presents an appearance of pseudo-exophthalmia, due to emaciation without retraction of the eyeballs. She has frequent movements of the lower jaw of a choreic character. Her pulse is slow and weak and her general condition the reverse of Graves' disease, as she is listless and apathetic. The thyroid gland seems to be wholly atrophied. Her case is interesting as one of cachexia thyriodopriva in the daughter, with Graves' disease in the mother.

The seventh case of Graves' disease is that of a young mar-

ried lady who developed goitre without an exophthalmia and with rather severe tachycardia. She improved, but had not recovered, when she became pregnant. This did not seem to affect the disease one way or the other. She gave birth to a child at term, but it lived only a few hours. She is now, at the expiration of a year, improved, but not fully restored. No mental shock of any kind had ever occurred to this patient, who, on the contrary, is of a very equable temperament, without nervousness, so to speak, in spite of persistent palpitation.

The eighth patient, a married lady aged forty-four, I saw in consultation with Dr. Emil Mayer, of this city, into whose care she had come after suffering for eighteen months with lancinating pains in both legs, persistent headaches, insomnia, and muscular tremors; then persistent diarrhoea with emaciation, losing forty-eight pounds in weight, with progressive weakness till she could not leave her bed. Meantime her heart action was 140 and there was general arterial throbbing. Various diagnoses had been made in her case, including general tuberculosis, but because she presented no sign of either goitre or of exophthalmia, Graves' disease had not been suspected. I diagnosticated her case as such, and under the treatment for that affection, including galvanism, her diarrhoea soon stopped and her improvement was progressive, so that on seeing her two months ago she had regained her flesh and color and her pulse was 70.

Now, in neither one of these eight cases was fright or any other emotion an element of the clinical history. With the exception of the two sisters mentioned, they were, on the contrary, more than usually free from causes of mental strain or depression in their life environment or experience, and so far, therefore, they indicate that mental factors are accidental rather than essential elements in the ætiology of the complaint.

Of these eight cases, both exophthalmia and goitre were wholly absent in one. Exophthalmia alone was absent in five. Goitre was absent in one, and was present slightly and only late in the disease, just before death, in one. Both exophthalmia and goitre were marked only in one. But in all there was

the same pronounced tachycardia and muscular tremor, and in each there was emaciation—moderate in five and very pronounced in three. In four, imperfect inspiratory power was noted, but not so particularly as I shall look for it hereafter after reading Dr. Louise Fiske Bryson's observations of this symptom in Graves' disease.

I have chosen these eight cases from my private practice notes because they sufficiently illustrate the familiar features of the disease which I wish to dwell upon as most related to its pathology. One peculiar case I will only further mention, that of a patient who was sent to me by her physician four months ago, and who presented remarkable aneurysmal dilations of the systemic arteries. There were several on the radial and on the right external carotid. The story was that they were transient in character. She had suffered a great deal from palpitation and tachycardia, but had no goitre or exophthalmia. Shortly after her visit she died suddenly with symptoms of hemiplegia.

The fact, therefore, that Graves' disease may exist even in a fatal degree of severity, as illustrated by the first patient in my list, without either exophthalmia or goitre, should be emphasized from the liability to the disease not being diagnosed, owing to the absence of these symptoms, as actually occurred in the case of the eighth patient. The enlargement of the thyroid is mentioned by all writers as very variable in degree and in duration, even in the same patient, and it is equally noted that the rapid action of the heart often both precedes the goitre and persists after its subsidence, it and the muscular tremor being the first symptoms to develop and the last to disappear, and together constituting the most invariable elements of the disease. Our attention, therefore, should be particularly directed to them as the most related to its pathology, and, moreover, the most important practically, as the earlier the recognition of the disease the better for its treatment. As to pathology, a paralytic lesion involving the common nucleus of the glossopharyngeal, vagus, and spinal accessory nerves, and extending to the neighboring vaso-motor center

in the medulla oblongata, would account for the whole group of symptoms which make up the picture of Graves' disease. In the first place, it should be noted that simple irritation of the lower branches of the glossopharyngeal and of the superior laryngeal nerves is sometimes accompanied by general muscular tremor. I once saw this amusingly illustrated by a stalwart young German butcher who came into my office trembling like a leaf because he had a fish bone stuck in his throat. He said in a husky voice that he was not frightened, but that he could not help shaking. With the laryngoscope I saw the bone directly across the chink of the glottis, and as soon as it was removed his shaking stopped. In experimental thyroidectomy on monkeys and dogs the commonest immediate result is stated to be general muscular tremor, which lasts for many weeks. I regard this symptom as the direct effect of injury to branches of the superior and recurrent laryngeal nerves, which, according to Lindemann, are the only nerves which supply the thyroid, rather than due to the effects of the removal of the gland itself upon the blood, for the tremor is much too immediate upon the operation to be so explained.

Now, such a bulbar lesion as we have supposed would also produce the other great constant feature of Grave's disease—namely, the tachycardia and the universal relaxation and throbbing of the systemic arteries. It would also explain the interference with the inspiratory expansion. It would not account, however, for the mechanism of the exophthalmia or of the goitre, though for the latter condition we have another cause to be mentioned presently. When we turn to pathological anatomy, however, we have no constant evidence of any textural lesion in the medulla, whether of the above-mentioned centers or of other parts. The experiments of Filehne, recently repeated with confirmatory results by Seeligmüller and by Bienfait, in which lesions of the restiform body produced increased pulse-rate and corresponding unilateral exophthalmia with muscular tremors, are open to the objection that it is difficult to perform such experiments without affecting contiguous bulbar centers. On the other hand, autopsies after

Graves' disease have not shown any constant distinctive changes in the testiform bodies any more than in the cervical sympathetic, which was once supposed to be the anatomical seat of the affection. These theories, moreover, share in common the objection that the enlargement of the thyroid and the exophthalmia are supposed to be the chief elements of the disease, which, as we have seen, is quite incorrect.

As pathological anatomy, therefore, has so far not revealed any truly characteristic change which can be causally associated with the genesis of Graves' disease, the question arises whether we can look elsewhere than to the nervous system for the *fons et origo* of the malady. Here I think that clinical experience may afford some significant intimations.

In the case of the first patient above mentioned I tried a great variety of remedies which I found recommended as serviceable in the treatment of this complaint. Belladonna, arsenic, nitrate of silver, the bromides, digitalis, and the iodides were prescribed in succession, without satisfactory results. The diarrhoea continued for many weeks unchecked by astringents, and the emaciation increased, with the rapid pulse and excessive nervousness and insomnia. At last I prescribed a complete change of diet, and ordered that the patient, who was now confined to her bed by her weakness and tremor, should be fed exclusively with matzoon and stale bread. The change for the better upon this diet was surprisingly rapid and progressive. The diarrhoea stopped without medicines, both her nervousness and sleeplessness improved, and finally the pulse became remarkably lessened. Iron then seemingly began to improve her anæmia, when before it appeared to aggravate her symptoms, and in the course of two months she seemed to be getting quite well. After four months she had so much improved that, contrary to my advice, she discontinued the matzoon and began to resume a meat diet, of which she was always very fond. Two months after this, on her return from the country, I found that all her former symptoms had recurred, including the diarrhoea. She again put on matzoon and again she improved, and this time she continued

the milk for about six months, with such a gain in flesh and color that she felt that she was well. She then went back to her ordinary diet, and I did not hear from her for some time, when I was called, to find her now worse than ever, because of the development of mental symptoms of both irritability and obstinacy which she had not shown before. She declared that she would rather die than take the matzoon, and nothing would persuade her to try milk in any form. One day I was sent for to see her because she seemed to be so low. I found her pulse to be with difficulty countable, and she was in a state of delirium with hallucinations. While I had my finger on the pulse, trying again to count it, it suddenly stopped, her pupils dilated, and the patient was dead with scarce a perceptible struggle.

Now, in this case a change of diet effected what drugs had quite failed to do; and then a first return to a meat diet brought back a return of the disease; then to be again and unmistakably arrested by discontinuing meat and resuming milk; and, lastly, a second return to meat brought back a fatal return of the disorder. This case has led me ever since that date (1880) to rely mainly on the dietetic treatment of Graves' disease, with such favorable results, both in hospital and private practice, that I have now little doubt that a specific disorder of intestinal, in distinction from gastric, digestion is a primary factor in the genesis of this affection. It is, of course, a familiar fact that diet has much to do with the therapeutics of functional nervous diseases, but until within recent years our practice in this respect has been based wholly upon empirical grounds. In such an instance as this, however, it is difficult not to infer a causal relation between the food taken and the resultant symptoms. The meat diet seemed to be not only a contributing but a direct cause of diarrhœa, tremor, and rapid heart action—as direct as we find in any other seemingly immediate connection.

That we have now more than empirical grounds for inferences about the relation of auto-infection to the genesis of many of the derangements of functional nervous diseases is as

well settled as any of the recent advances of pathology. In the processes of normal intestinal digestion it is claimed, on apparently well-ascertained facts, that the healthy system is constantly producing organic poisons, which are as capable of causing injury as any of the products of retrogressive metabolism in the body at large. We may therefore have specific disturbances occur from these organic poisons in either of two ways: First, by their excessive generation, or, secondly, by a failure in the normal functions of the body which are protective against them, from deficiency in the protecting functions of the organs themselves, or from a greater virulence in the poison generated than they can counteract. An effect from diet, therefore, in nervous disorders, one way or the other, would be explicable on chemical principles rather than on nervous textural changes, and, from my experience in the treatment of functional nervous diseases, I am becoming more and more persuaded that we have in this direction greater promise of progress, both in theory and in practice, than in hypotheses of irritative nervous lesions as the source of many functional disorders, Grave's disease included. On this point Dr. Fagge well remarks: "Some writers have endeavored to account for all the phenomena of the [Graves'] disease on a theory of irritation. But it is a sufficient objection to such a view that a primary irritation of a nerve center, lasting for months or years unchanged, is as yet unknown to pathology."

On the other hand we may say that, while a structural lesion in the medulla which would account for the phenomena of Graves' disease is almost inconceivable without its sooner or later involving all the vital functions of that seat of life, yet particular functional derangements produced by toxic agents are just what might be expected, for nothing is more characteristic than the narrowly selective operation of functional nervous poisons, which may go on for years, as in the case of opium, affecting certain functions without producing either progressive changes in them or extension to other functions.

The chief hindrance to committing ourselves to the toxic in distinction from the structural ætiology of such diseases is the

considerable change which it involves in our views of the pathology of functional nervous diseases in general. It seems to offer too tempting, because too easy, a solution of many of the most obscure problems of practical medicine. That its advocates are often carried away by its far reaching conclusions is undeniable, and many of their deductions are open to criticism on the score both of haste and of hobby-riding. But just the same may be said of bacteriology—namely, that it is too much like a blazing comet passing through the medical sky, with a nucleus of fact surrounded by a cloud of seemingly mere gas, carrying a tail of still more tenuous interferences stretching out to infinity. We need not, however, surrender our nucleus of facts, nor legitimate inference based upon them, because everything can not be demonstrated at once in a newly discovered field.

Certainly there is one fact in Graves' disease which points much more distinctly to a digestive disorder than to a structural nervous lesion, and that is its occurrence in women about ten times as often as in men. We can hardly imagine that this difference is due to a difference in the medulla between the two sexes. That the digestive apparatus in women, however, is subject to special disorders is notorious. Many years ago I published in the Transactions of the Medical Society of the State of New York the case of a girl who, after a suppression of the menses from a wetting in a thunder shower, had first an obstinate constipation, which was attributed by the late Dr. White, Professor of Obstetrics in Buffalo, and for a time also in Bellevue Hospital Medical College, to intestinal obstruction, as she had developed stercoraceous vomiting. In the further progress of her case, however, her bowels were made to act, but the dejecta showed a total absence of coloring matter. She then had sudden suppression of urine, which was soon followed by profuse salivation and lacrymation, but which stopped after five days, when the kidneys started secretion again, and this alternation between the flow from the bladder and from the mouth continued at intervals till her death, about three months after the beginning of her affection,

Such a case, however, only illustrates in an extreme what derangements in the secretions and in the chemistry of the products of the blood-making and of the blood-purifying glands can take place from nervous disorders in the splanchnic system of women, and hence renders the surmise probable that if auto-infection from the intestine can take place at all, it may be looked for in women with special frequency. I may mention, therefore, in this connection, that I have not yet seen a case of severe Graves' disease in which diarrhoea was not sooner or later a prominent symptom.

On the other hand, it may be asked, if the symptoms of Graves' disease are to be ascribed to toxic infection of the blood by intestinal poisons, what relation has that fact to the common implication of the thyrioid in this affection? To this it may be replied that the facts of both sporadic myxœdema and cachexia following thyrioidectomy, in both man and in animals, point much more to a metabolic function of the thyrioid than to a secreting one. It may be questioned whether such be not the main function of the ductless blood gland—that is, that they produce changes in the blood passing through them that may free the blood of otherwise toxic products, rather than that they add particular secretions of their own to it. The interesting experiments of Grützner seem to support this conclusion as regards the thyrioid, for he found that the blood of an animal from which the thyrioid had been removed, when injected into the veins of another animal, caused symptoms in it similar to those observed by Kocher in operative myxœdema in man.

The phenomena of Graves' disease, however, are those of excessive action of the thyrioid, rather than those of the contrasting symptoms of thyrioid atrophy; as if the gland were overstimulated by some ingredient in the blood which it can not sufficiently neutralize, for it is noticeable that the thyrioid is found in many cases not so much diseased after death as that its proper tissue is apparently hypertrophied. Certainly it often seems so to act in these patients during life, presenting a variation in bulk which causes it to resemble an erectile

tissue in its alternate enlargement and subsidence, so different from endemic or ordinary goitre. This appears to me a much more probable explanation than the view of Chevalier, who ascribes Graves' disease to an intoxication of the nervous system by products of the thyrioid, because it is rather removal or atrophy of the thyrioid which is most constantly followed by signs of an intoxication due to the absence of its preservative functions.

As to the relation of a meat diet to disorders of the thyrioid, I will only cite for what they are worth some references to published observations. L. Breisacher, of Leipzig, finds that meat and meat extractives exert a poisonous influence on dogs after thyrioidectomy. Ewald and Rockwell are quoted in in Sajous's *Annual of the Universal Medical Sciences*, 1891, as finding the removal of the thyrioid in pigeons to exert no perceptible influence on their health. They chose pigeons as pure vegetable feeders, to corroborate the earlier observations of Ewald, in which he ascribed the difference in the effects of thyrioidectomy between dogs and rabbits to the difference in their diet. Charcot, in his lectures on Graves' disease, lays special stress on the benefit to be derived from a milk diet.

Now that examination of the urine includes so much more than tests for albumin or sugar or the proportion of urea, there is much to be hoped for in researches of its composition in cases of functional nervous diseases. The chemistry of the urine, however, is evidently not an easy subject either in health or in disease. The existence of alkaloidal poisons in it is very variously reported, but meantime there is no reason to be incredulous that much light is yet to be thrown upon the relation of toxic ingredients in this secretion to the clinical facts of a great variety of morbid conditions. As regards Graves' disease, I find a reference in Sajou's *Annual*, 1892, to researches by Boinet and Silbert, reported in the *Marseilles médical*, who profess to have found three principal varieties of ptomaines in the urine of a case of exophthalmic goitre. One possesses a convulsive action and produces arrhythmia, weakens the systole and arrest of the heart in diastole, while an-

other causes a primary increase in systolic energy and afterward enfeeblement and arrest in diastole. Such observations, however, of urinary ptomaines in disease are not yet sufficiently uniform or distinctive to claim much authority.

My treatment of Graves' disease is mainly based upon its supposed relation to digestive disorders. In the first place, it seems to me that a meat diet is to be as much restricted in these patients as a starchy diet in diabetes. Fresh, undiluted milk also is, in my experience, not to be allowed, from its indigestibility with most healthy adults. It is a significant fact that races like the Tartars, the Beduins, and the Guachos of South America, who have to live upon milk, have all found by experience that it has to be fermented first before it can become a staple and, as with them, about their only daily diet. All the world over the ferment for this purpose is the same—namely, the yeast plant. With fresh, good milk fermented every day, as it is by the Arabs and the peoples of western Asia, and now sold here pretty extensively under the Turkish name of matzoon, I have relieved more cases of vomiting from organic diseases of the stomach than by any other one article. In Graves' disease it has in my experience, as above mentioned proved especially beneficial.

Medicinally, I think it is well to begin treatment by a mercurial purgative, as the ordinary blue pill, to be repeated occasionally from time to time. In some patients this will be found particularly useful against the diarrhoea. Then, three or four times a day, I prescribe in capsule five grains of equal parts of bismuth subcarbonate and powdered calumba, with four grains of salol and five of benzoate of sodium; or capsules of ten grains of bismuth salicylate with two of B-naphthol and two of ichthyol. The best time for these intestinal antiseptics to be taken is an hour after meals.

As a vaso-motor tonic, I now rely chiefly on ten-drop doses of tincture of strophanthus half an hour before meals.—*New York Medical Journal*.

EYE TUBERCULOSIS AND ANTITUBERCULAR INOCULATION IN THE RABBIT.¹

BY E. L. TRUDEAU, M.D., SARANAC LAKE, N. Y.

GENTLEMEN.—At the last meeting of this association I presented a paper on the Treatment of Experimental Tuberculosis, illustrating the influence of such treatment on eye tuberculosis in the rabbit by photographs and living animals. The two last conclusions reached were as follows:

"Experimental tuberculosis in the rabbit's eye can be cured by such injections. The permanency of this cure has not yet been established."

A more extended experience has shown me that the cure of inoculation tuberculosis in the rabbit's eye by this method is by no means always a constant result or one which can be brought about invariably at will. I have failed often where I had every reason to expect success, and I have succeeded where I had no special reason to hope for a favorable result. This inconstancy in results may be explained by the great difficulty of controlling the relation existing between all the factors involved in the problem, such as the virulence of the bacilli injected, their number, the virulence of the microbes from which the tuberculin was made, and the degree of individual resistance possessed by each animal. Cures do occur, however, and appear to have a certain degree of permanence, as the two animals I now show you illustrate. These rabbits were inoculated in the eye with cultures of tubercle bacilli of human origin more than a year ago. The eye of the untreated control is cheesy and atrophied. That of the treated animal

¹Remarks made before the Association of American Physicians at its eighth annual meeting.

shows but the fibrous evidence of the inflammatory changes of which it has been the seat; the sight is unimpaired, the cornea clear, the inoculation wound a mere corneal scar; the iris, dilated and showing on its surface small grayish fibrous specks at the site of the once evident miliary tubercles, is still adherent to the lens by fibrous bands, while the vascularity of the eye is normal. The present appearance has remained unchanged for six months.

Hitherto the tubercle bacillus has always been considered as a pathogenic microbe having but one source and possessed of a very constant degree of virulence. More recent researches by Muffici, Koch, Metchnikoff, Courmont and Dor, and Loeb have taught us that the virulence of this germ varies greatly and that there are two distinct races of tubercle bacilli—the mammalian and the avian. Loeb's experiments made in Koch's laboratory demonstrated that bacilli cultivated uninterruptedly for nine years and having descended from the original cultures used by Koch in his first experiments, and which then killed both guinea-pigs and rabbits within six to ten weeks, were no longer pathogenic for rabbits and but slightly so for guinea-pigs. Principally through the labors of the above-mentioned investigators it has also become known that the avian tubercle bacillus is apparently a race by itself and that it presents certain quite constant cultural and pathogenic peculiarities not observed in the microbe originally discovered, studied, and described by Koch. Whether these variations have merely been acquired by Koch's bacillus as the result of a long parasitic life history in the organism of birds, or whether they indicate a permanent difference of race, is still a disputed point; as yet, however, it has been found impossible by laboratory and inoculation experiments to show that either variety of these germs can be transformed into the other. In 1890 I presented and described before this association cultures of the tubercle bacillus which were not pathogenic for guinea-pigs and which showed marked cultural variations from the standard. The original source of these bacillary growths was somewhat doubtful, as they had been brought from Europe,

and I supposed them to have become attenuated while under cultivation. In the light of recently acquired facts, however, it is quite evident that these attenuated cultures were bird tuberculosis, and the description then given will answer very well for the avian microbe as we now know it. In growing this variety of the tubercle bacillus from the lesions of tubercular birds, not only have I been able to confirm many of the observations made by Maffei, Koch, and the French experimenters, but I have been struck as well with two marked peculiarities which I have not seen described:

1. The ease with which the chicken bacillus adapts itself to a saprophytic existence, which is in strong contrast to the well-known difficulty of obtaining first growths of Koch's bacillus in artificial media, for the avian microbe grows readily direct from the lesions of birds in most of the media in use, whether solid or fluid.

2. The strong anaerobic attribute possessed by the bird bacillus, which enables it to thrive readily within and beneath fluid media as well as on the surface, while the human microbe grows only when floated on the surface of liquids and in constant contact with oxygen, and develops almost imperceptibly or not at all when immersed. The human bacillus has been found by all observers to be about harmless for birds; though in rare instances intra-peritoneal inoculations may cause an eruption of tubercle in these animals, intra-peritoneal re-inoculations of this tubercle prove negative and the animals remain healthy. The avian bacillus, when fresh from the lesions of birds or when cultivated but a short time in artificial media, is about harmless for dogs and guinea-pigs. Rabbits are, however, more susceptible to it, and die readily from intravenous, intra-peritoneal, and intra-thoracic injections of not excessive amounts of these cultures. On autopsy, they may either show extensive generalized tubercular lesions or they may present no evidence of tubercle in any organ, but an extreme emaciation only, as if they had died of chronic septic intoxication. When a small amount—0.05 to 0.25—of liquid culture grown a month direct from the chicken is injected under the skin, the

animal generally recovers; an abscess is formed at the site of the inoculation which tends slowly to soften and become diffuse and, finally, if the animal survives, disappears almost entirely. This brings us to the subject of preventive inoculation.

Antitubercular inoculation was first tried by Falk in 1883, and all attempts in this direction have resulted until recently in but an unbroken record of failures. In 1890 I added my name to the list of those who found it impossible to produce immunity in animals by this method. In 1890 Martin and Grancher and Courmont and Dor claimed to have produced in rabbits a certain degree of immunity by previous inoculation after Pasteur's hydrophobia method of avian tubercle bacilli of graded and increasing virulence. These vaccinations were, however, frequently fatal to the animals, and the immunity obtained was but slight. Richet and Hericourt have since claimed to produce complete immunity in dogs by intravenous inoculations of bird tubercle bacilli. These experimenters found that though harmless to the dog when first derived from the chicken, bird bacilli, by long cultivation in liquid media, became pathogenic for this animal, and by thus grading the virulence of the injections, complete immunity against any form of tubercular infection was produced in the dog. As yet these striking results have not been confirmed. The animals which I now present to you illustrate an attempt I have made along the same line to produce immunity in the rabbit. Cultures grown directly from the chickens' lesions in bouillon for first five weeks, then six months, were twice injected subcutaneously at intervals of twenty-one days in doses of 0.025 and 0.05, and a third injection of a still older culture was occasionally given.

About one in four of the rabbits died within three months, profoundly emaciated, but without any visible tubercular lesions. The remaining animals recovered and were apparently in good health when, together with an equal number of controls, they were inoculated in the anterior chamber of the eye with cultures of Koch's bacillus derived from the tuberculous lesions of the rabbit and cultivated about three months on glycerin agar. The results of these inoculations present many

points of interest. In the controls, as is usually the case, if the operation has been done carefully and aseptically and with a moderate amount of dilute virus, two days after the introduction of the virulent material in the eye little or no irritation is observed, and little is to be noticed for two weeks, when a steadily increasing vascularity manifests itself, small tubercles appear on the iris which gradually coalesce and become cheesy, intense iritis and general inflammation of the structures of the eye develop, the inoculation wound becomes cheesy, and in six to eight weeks the eye is more or less completely destroyed and the inflammation begins to subside. The disease, however, remains generally localized in the eye for many months, and even permanently. In the vaccinated animals, on the contrary, the introduction of the virulent bacilli at once gives rise to a marked degree of irritation. On the second day the vessels of the conjunctiva are tortuous and enlarged, whitish specks of fibrinous-looking exudation appear in the iris and in the anterior chamber, and more or less intense iritis supervenes, but at the end of the second to the third week, when the eyes of the controls begin to show progressive and steadily increasing evidence of inflammatory reaction, the irritation in those of the vaccinated animals begins slowly to subside and the eyes to mend. The vascularity is less, the whitish spots of fibrinous material appear smaller, the structures of the eye become clearer, the inoculation wound is but a bluish, fibrous scar, until in from six to twelve weeks in successful cases all irritation has disappeared and the eyes present, as in the animals I now show you, but the fibrous evidence of the traumatism and the inflammatory processes which have been set up by the inoculation. In all the controls, as you see, the inoculation wound is cheesy and the cornea and iris are more or less destroyed by tubercles and cheesy areas.

Some of the protected animals slowly relapse, and the one I now show you has small tubercles growing on the iris; but even in such eyes the entire absence of caseation is noticeable and the disease progresses almost imperceptibly. I have repeated this experiment on three sets of rabbits with about the

same results each time. The vaccinations as practiced are of themselves, in some instances fatal, but the fact remains that where recovery takes place a marked degree of immunity has been acquired. I do not lay any claim, therefore, to have produced a complete or permanent immunity by a safe method but it seems to me that these eyes constitute a scientific demonstration of the fact that in rabbits preventive inoculation of bird tubercle bacilli can retard and even abort an otherwise progressive localized tubercular process so completely as to prevent destruction of the tissues threatened, and that the future study of antitubercular inoculation may not be as entirely hopeless as it has until recently appeared.—*N. Y. Med. Jour.*

NEWS.

A WEEK ON CATARACT.

The Philadelphia Polyclinic will devote a special week, beginning October 30, to the consideration of cataract. Cataract operations will be done by the different methods preferred, by Professors Harlan, Jackson, Risley, and deSchweinitz, including both extraction with iridectomy and simple extraction. The whole subject including points of etiology, diagnosis, the dressing and after treatment of cases will be considered.

In addition to clinic, demonstrations, and practice of operations on the eyes of lower animals, there will be a series of conferences participated in by the Professors and Members of the class, such as have on former occasions been found both interesting and profitable.